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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,658	11/24/2003	John Terry	042933/303048	4642

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EXAMINER
DEAN, RAYMOND S

ART UNIT	PAPER NUMBER
2618	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/720,658	TERRY ET AL.
	Examiner	Art Unit	
	Raymond S. Dean	2618	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>14 December 2007</u>.

2a)☒ This action is **FINAL.**   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10 and 12-29* is/are pending in the application.

　　4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10 and 12-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>15 March 2004</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

　　Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

　　Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

　　a)☐ All b)☐ Some * c)☐ None of:

　　　1.☐ Certified copies of the priority documents have been received.

　　　2.☐ Certified copies of the priority documents have been received in Application No. _____.

　　　3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

　　* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
　　Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
　　Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Response to Arguments

1.   Applicant's arguments filed December 14, 2007 have been fully considered but they are not persuasive.

Examiner respectfully disagrees with Applicants' assertion on Page 12, 1st Paragraph "Nowhere in the cited portion or any other portion of Kadous is there any teaching ...". Kadous teaches in Col. 4 lines 4 – 10, which was also cited by Applicants, that each data stream is modulated based on a **particular** modulation scheme selected for **that** data stream. Kadous further teaches in Col. 15 lines 59 – 63 that a separate modulation scheme is used for each data stream. The fact that there is a **separate** or **particular** for each data stream renders a myriad of scenarios such as Applicants' asserted scenario of the same modulation scheme being used for each data stream or a different modulation scheme being used for each data stream as claimed.

Examiner respectfully disagrees with Applicants' assertion on Page 12, 3rd Paragraph "Kadous is incapable of teaching or suggesting that a first mapper ...". If OFDM is not employed then the modulation symbols are sent to the antennas (124) (See Kadous Col. 17 lines 7 - 10). The modulation symbols are sent to the antennas via the TX MIMO processor thus Kadous still reads on the limitation in question.

Examiner respectfully disagrees with Applicants assertion on Page 13, 3rd Paragraph "Kadous fails to teach or suggest elements of the first mapped values differing ...". Kadous, as set forth above, teaches a separate modulation scheme for

each data stream such as BPSK for data stream 1 and QPSK for data stream 2. The

BPSK constellation is different from the QPSK constellation in that the symbol values

are different. The I component value and the Q component value make up the symbol

value. The I and Q component values of all of the symbols in a QPSK constellation are

different from I and Q component values of all of the symbols in a BPSK constellation.

Claim Rejections - 35 USC § 102

2.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3.   Claims 1 – 9, 16 – 17, and 21 – 23 are rejected under 35 U.S.C. 102(e) as being

anticipated by Kadous (US 6,636,568).

Regarding Claims 1, 16, 21, Kadous teaches an apparatus/method comprising: a

first mapper adapted to receive first representations of a first portion of the

communication data (Figure 5, Col. 16 lines 1 – 52), said first mapper for mapping the

first representations of the first portion of the communication data into first mapped

values according to a first mapping scheme (Figure 5, Col. 16 lines 1 – 52, See Also

Response To Arguments above); a second mapper adapted to receive second

representations of a second portion of the communication data (Figure 5, Col. 16 lines 1

– 52), said second mapper for mapping the second representations of the

communication data into second mapped values according to a second mapping

scheme (Figure 5, Col. 16 lines 1 – 52, See Also Response To Arguments above), the

second mapping scheme exhibiting a mapping property that differs with the first

mapping scheme (Figure 5, Col. 16 lines 1 – 52), wherein the first mapper transmits the

first mapped values to a first antenna transducer among a plurality of antenna

transducers and wherein the second mapper transmits the second mapped values to a

second antenna transducer among the plurality of antenna transducers (Figure 5, Cols.

15 lines 57 – 67, 16 lines 1 – 67, 17 lines 1 – 15, See Also Response To Arguments

above), the first and second antenna transducers receive and transduce only the first

mapped values and the second mapped values, respectively, into electromagnetic form

for communication upon the communication channel (Figure 5, Cols. 15 lines 57 – 67,

16 lines 1 – 67, 17 lines 1 – 15).

Regarding Claims 2, 22, Kadous teaches all of the claimed limitations recited in

Claims 1, 21. Kadous further teaches a first encoder adapted to receive the first

portion of the communication data, said first encoder for encoding the first portion of

the communication data according to a first encoding techniques (Figure 5, Col. 16

lines 21 – 23) and wherein the first representations of the first portion of the

communication data to which said first mapper is adapted to receive comprise first-

encoded values formed by said first encoder (Figure 5, Col. 16 lines 21 – 52).

Regarding Claims 3, 23, Kadous teaches all of the claimed limitations recited in

Claims 1, 21. Kadous further teaches a second encoder adapted to receive the second

portion of the communication data, said second encoder for encoding the second

portion of the communication data according to a second encoding technique (Figure

5, Col. 16 lines 21 – 23) and wherein the second representations of the second portion

of the communication data to which said second mapper is adapted to receive

comprise second-encoded values formed by said second encoder (Figure 5, Col. 16

lines 21 – 52).

Regarding Claim 4, Kadous teaches all of the claimed limitations recited in Claim

1. Kadous further teaches wherein the first mapped values into which said first mapper

maps the first representations of the first portion of the communication data comprises

a first set of mapped values, wherein the second mapped values into which said

second mapper maps the second representations of the second portion of the

communication data comprise a second set of mapped values, elements of the first set

of mapped values differing in value with elements of the second set of mapped values

(Col. 16 lines 36 – 52, the modulation schemes are different thus the constellations that

correspond to said schemes are different which means that the symbol values that

make up said constellations are different).

Regarding Claim 5, Kadous teaches all of the claimed limitations recited in Claim

4. Kadous further teaches wherein the first set of mapped values and the second set

of mapped values formed by said first mapper and said second mapper, respectively,

are formed of mutually-exclusive elements (Col. 16 lines 36 – 52, the modulation

schemes are different thus the constellations that correspond to said schemes are

different which means that the symbol values that make up said constellations are

different, since the symbol values are different there is mutual exclusivity, See Also Response To Arguments above).

Regarding Claim 6, Kadous teaches all of the claimed limitations recited in Claim 4. Kadous further teaches wherein the mapping property exhibited by the second mapping scheme that differs with that of the first mapping scheme comprises vector magnitudes that differ (Col. 16 lines 36 – 52, the modulators can use a plurality of modulation/mapping schemes thus a first modulator can use a modulation/mapping scheme that differs from the modulation/mapping scheme of a second modulator said modulation schemes will have differing constellations and thus differing vector magnitudes).

Regarding Claim 7, Kadous teaches all of the claimed limitations recited in Claim 1. Kadous further teaches wherein the first mapped values into which said first mapper maps the first representations of the first portion of the communication data comprise a first set of mapped values that exhibits first geometric differences there between, wherein the second mapped values into which said second representations of the second portion of the communication data comprise a second set of map values that exhibit second geometric differences there between (Col. 16 lines 36 – 52, the modulators can use a plurality of modulation/mapping schemes thus a first modulator can use a modulation/mapping scheme that differs from the modulation/mapping scheme of a second modulator, said modulation schemes will have differing constellations and thus differing vector magnitudes, since the constellations differ the geometric differences between the values or states of the first constellation will differ

from the geometric differences between the values or states of the second

constellation).

Regarding Claim 8, Kadous teaches all of the claimed limitations recited in Claim

7. Kadous further teaches wherein the first geometric differences between the mapped

values of the first set and the second geometric differences between the mapped

values of the second set are mutually exclusive (Col. 16 lines 36 – 52, since the

constellations differ the geometric differences between the values or states of the first

constellation will differ from the geometric differences between the values or states of

the second constellation, since said geometric differences are associated with mapped

values that are mutually exclusive the geometric differences will be mutually exclusive).

Regarding Claim 9, Kadous teaches all of the claimed limitations recited in Claim

7. Kadous further teaches wherein the mapping property exhibited by the second

mapping scheme that differs with that of the first mapping scheme comprises second

geometric differences that differ in lengths with lengths of the first geometric

differences (Col. 16 lines 36 – 52, since the constellations differ the geometric

differences between the values or states of the first constellation will differ from the

geometric differences between the values or states of the second constellation, said

geometric properties comprise lengths thus the lengths will differ).

Regarding Claim 17, Kadous teaches all of the claimed limitations recited in

Claim 16. Kadous further teaches transducing the selected first mapped values and

the selected second mapped values applied during said operation of selectably

applying into electromagnetic form and delivering, by way of the communication

channel, the selected first and second mapped values, respectively, to the receiving

station (Figure 6, Col. 17 lines 53 – 62).

Regarding Claim 24, 26, Kadous teaches all of the claimed limitations recited in

Claims 1, 21. Kadous further teaches wherein the first mapping scheme generates a

first constellation set comprising a first plurality of symbol points (Col. 16 lines 1 – 52)

and wherein the second mapping scheme generates a second constellation set

comprising a second plurality of symbol points (Col. 16 lines 1 – 52), wherein a first

distance between each of the first plurality of symbol points is different from a second

distance between each of the second plurality of symbol points (Col. 16 lines 1 – 52, the

distance between each of the symbol points in a 64 QAM constellation is different from

the distance between each of the symbol points in a QPSK constellation).

Regarding Claim 25, Kadous teaches all of the claimed limitations recited in

Claims 16. Kadous further teaches wherein prior to transmitting only the first mapped

values, generating, according to the first mapping scheme, a first constellation set

comprising a first plurality of symbol points (Col. 16 lines 1 – 52) and generating,

according to the second mapping scheme, a second constellation set comprising a

second plurality of symbol points (Col. 16 lines 1 – 52), wherein a first distance between

each of the first plurality of symbol points is different from a second distance between

each of the second plurality of symbol points(Col. 16 lines 1 – 52, the distance between

each of the symbol points in a 64 QAM constellation is different from the distance

between each of the symbol points in a QPSK constellation).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kadous (US 6,636,568) in view of Li et al. (US 7,068,628).

Regarding Claim 10, Kadous teaches all of the claimed limitations recited in Claim 1. Kadous does not teach wherein the mapping by which said first mapper maps the first representations and the mapping by which said second mapper maps the second representations are together selected to define a layered code having combined values that are applied to a respective one of the plurality of antenna transducers.

Li teaches defining a layered code having combined values that are applied to a respective one of the plurality of antenna transducers (Cols. 10 lines 64 – 67, 11 lines 1 – 6, the space-time code enables a layered code having combined values).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Kadous with the space-time code configuration of Li for the purpose of improving the transmission efficiency as taught by Li.

6.   Claims 12 – 15 and 18 – 20 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Kadous (US 6,636,568) in view of Ketchum (US 6,731,668).

Regarding Claims 12, 18, Kadous teaches all of the claimed limitations recited in

Claims 1, 17. Kadous further teaches a receiving station for receiving the

communication data once communicated upon the communication channel (Figure 6,

Col. 17 lines 53 – 62), a further improvement of apparatus for the receiving station for

facilitating detection of the communication data, said apparatus comprising: a decoder,

which exploits the difference in mapping properties between the first and second set

(Figure 8A, the decoder (836a) decodes the first set), adapted to receive indications of

the communication data communicated upon the communication channel and

delivered to the receiving station (Figure 6, Col. 18 lines 26 – 30, lines 45 – 47).

Kadous does not teach a maximum likelihood decoder, which exploits the

difference in mapping properties between the first and second set, adapted to receive

indications of the communication data communicated upon the communication channel

and delivered to the receiving station, said maximum likelihood decoder for determining

a maximum likelihood path that defines selection of values of the communication data,

the maximum likelihood path selected from amongst a set of possible paths, each

defining communication data value possibilities.

Ketchum teaches a maximum likelihood decoder for determining a maximum

likelihood path that defines selection of values of the communication data, the

maximum likelihood path selected from amongst a set of possible paths, each defining

communication data value possibilities (Column 3 lines 19 – 26, Column 8 lines 45 – 60).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the receiver of Kadous with the Viterbi decoder of Ketchum as an alternative means of decoding a received signal thus providing an information sequence with a minimal number of errors as taught by Ketchum.

Regarding Claim 13, Kadous and in view of Ketchum teaches all of the claimed limitations recited in Claim 12. Ketchum further teaches wherein the set of possible paths from amongst which said maximum likelihood decoder selects the maximum likelihood path comprises fewer than all of the possible paths (Column 3 lines 19 – 26).

Regarding Claims 14, 20, Kadous and in view of Ketchum teaches all of the claimed limitations recited in Claims 12, 19. Ketchum further teaches wherein the set of possible paths from amongst which said maximum likelihood decoder selects the maximum likelihood path is selected responsive to a mapping scheme pursuant to which a mapper maps representations (Column 3 lines 19 – 26). Mantravadi further teaches a first and second mapping scheme (Sections 0105, 0106 lines 1 – 6).

Regarding Claims 15, Kadous and in view of Ketchum teaches all of the claimed limitations recited in Claims 14. Ketchum further teaches wherein the set of possible paths from amongst which said maximum likelihood decoder selects the maximum likelihood path is selected responsive to a mapping scheme pursuant to which a mapper maps representations (Column 3 lines 19 – 26). Kadous further teaches a first and second mapping scheme (Figure 5, Col. 16 lines 1 – 52).

Regarding Claim 19, Kadous and in view of Ketchum teaches all of the claimed

limitations recited in Claim 18. Ketchum further teaches prior to said operation of

decoding, of selecting the set of possible paths from which the maximum likelihood

path is formable (Column 3 lines 19 – 26).

7.   Claims 27 – 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Kadous (US 6,636,568) in view of Kammoun et al. (2003 4th IEEE Workshop on Signal

Processing Advances in Wireless Communications).

Regarding Claim 27 – 29, Kadous teaches all of the claimed limitations recited in

Claims 1, 16, 21. Kadous does not teach wherein the first mapping scheme comprises

a spherical modulation scheme and wherein the second mapping scheme comprises a

lattice modulation scheme.

Kammoun teaches a spherical modulation scheme and a lattice modulation

scheme (Figure 3, Page 509, Sections 5.1, 6 lines 1 – 2).

Kadous and Kammoun both teach a wireless system in which digital modulation

is used in order to transmit information thus it would have been obvious to one of

ordinary skill in the art at the time the invention was made to use the above modulations

of Kammoun as an alternative means for achieving the same predictable result of using

digital modulation in order to transmit information.

Conclusion

8.   Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond S. Dean whose telephone number is 571-272-7877. The examiner can normally be reached on Monday-Friday 6:00-2:30.
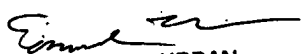
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward F. Urban can be reached on 571-272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Raymond S. Dean
February 15, 2008

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